Groundwater Estimation and Determination of its Probable Recharge Source in the Lower Swat District, Khyber Pakhtunkhwa, Pakistan by using Analytical Data and Linear Regression Algorithms

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Groundwater is used in all sectors and its over-exploitation enhance the burden on groundwater, moreover, the improper investigation, random selection of drilling sites will ultimately affect the quantity of groundwater. Groundwater estimation via actual field data and machine learning based approaches for feasible exploration sites in Lower Swat district were carried out. For this purpose, study area was divided into seven zone based on the lithology and distance from river Swat. Surface (river, canals) and groundwater (wells, springs,) samples were collected and analyzed for various physicochemical parameters including major and trace elements to find the probable recharge source in the flood plain area of Swat River. X-ray Fluorescence (XRF) analysis of the rock samples collected from the spring's host were also performed to compare its mineral constituents with the dissolved load of the analyzed groundwater samples. Analytical data interpretation reveals that the recharge source for groundwater in the flood plain regime is Swat River, while infiltration and percolation of rainwater act as a probable recharge source in the mountainous and elevated areas. Acceptable similarities were observed in the geochemical composition of the rock samples, spring's water samples and representative wells in their immediate neighborhood. A linear relationship was observed between the water table and distance from Swat River illustrates that water depth in wells increases with increasing distance from the main recharge source. Furthermore, predicted zones for potential water wells were marked in model wells by using linear regression algorithms of machine learning techniques.